Emission Summary

Permit Number: 969250P

Source Status: New☒ Modification☐ Expansion☐ Relocation☐ **Permit Status:** New☒ Renewal☐

PSD☐ NSPS☒ NESHAPs☒ **Previous Permit Number:** Construction _____ Operating _____

57-0392-01: 300 hp John Deere 6081AF001

	Pounds/Hour			Tons/Year				Date of Data	*	Applicable Standard
	Actual	Potential	Allowable	Actual	Potential	Allowable	Net Change			
PM**			0.27			0.07		8/29/14	1	40 CFR §60.4205(a)
SO_2			neg			neg		8/29/14	2	1200-03-14-.03(5)
CO**			5.62			1.41		8/29/14	1	40 CFR §60.4205(a)
VOC**			0.64			0.16		8/29/14	1	40 CFR §60.4205(a)
NO_x**			4.54			1.13		8/29/14	1	40 CFR §60.4205(a)
HAPs					neg	na		8/29/14	3	
CO_2e					85.7	na		8/29/14	5	

The above emission data are from standards found in 40 CFR 60.4025. The SO_2 emissions were calculated using 15 ppm sulfur content of the fuel (NSPS requirement), assuming all available sulfur is converted to SO_2. The ton per year allowables are calculated at 500 hr/yr per guidance found in the Seitz memo regarding PTE calculations for emergency engines.

* Source of data codes are found on the back of the APC 100.

** The allowable emission limits are subject to 40 CFR part 60 Subpart IIII. This emergency engine must meet the emission requirements in §60.4205(a), Table 1 for a 300 hp engine. Allowable hydrocarbon (HC) emissions are represented as VOC in the table above.

57-0392-02: 36.3 hp Yanmar 4TNV84T

	Pounds/Hour			Tons/Year				Date of Data	*	Applicable Standard
	Actual	Potential	Allowable	Actual	Potential	Allowable	Net Change			
PM**			0.05			0.01		8/29/14	1	40 CFR §60.4205(a)
SO_2			neg			neg		8/29/14	2	1200-03-14-.03(5)
CO**			0.33			0.08		8/29/14	1	40 CFR §60.4205(a)
VOC**			--			--		8/29/14	1	40 CFR §60.4205(a)
NO_x**			0.57			0.14		8/29/14	1	40 CFR §60.4205(a)
HAPs					neg	na		8/29/14	3	
CO_2e					10.4	na		8/29/14	5	

The above emission data are from standards found in 40 CFR 60.4025. The SO_2 emissions were calculated using 15 ppm sulfur content of the fuel (NSPS requirement), assuming all available sulfur is converted to SO_2. The ton per year allowables are calculated at 500 hr/yr per guidance found in the Seitz memo regarding PTE calculations for emergency engines.

* Source of data codes are found on the back of the APC 100.

** The allowable emission limits are subject to 40 CFR part 60 Subpart IIII. This emergency engine must meet the emission requirements in §60.4205(a), Table 1 for a 36.3 hp engine. The applicable standard for NO_x is in terms of NO_x + NMHC. Therefore, the allowable VOC emissions are accounted for in NO_x.

Emission Summary (cont.)

Permit Number: 969250P

57-0392-04: 66 hp John Deere 4039D

	Pounds/Hour			Tons/Year				Date of Data	*	Applicable Standard
	Actual	Potential	Allowable	Actual	Potential	Allowable	Net Change			
PM		0.15	0.28		0.04	0.07		8/29/14	3	1200-03-06-.02(2)(b)
SO_2			neg			neg		8/29/14	2	1200-03-14-.03(5)
CO		0.44			0.11			8/29/14	3	
VOC			neg			neg		8/29/14	3	
NO_x**			1.0			0.25		8/29/14	1	40 CFR §60.4205(a)
HAPs					neg	na		8/29/14	3	
CO_2e					18.9	na		8/29/14	5	

The above emission data are from standards found in 40 CFR 60.4025. The SO_2 emissions were calculated using 15 ppm sulfur content of the fuel (NSPS requirement), assuming all available sulfur is converted to SO_2. The ton per year allowables are calculated at 500 hr/yr per guidance found in the Seitz memo regarding PTE calculations for emergency engines.

* Source of data codes are found on the back of the APC 100.

** The allowable emission limits are subject to 40 CFR part 60 Subpart IIII. This emergency engine must meet the emission requirements in §60.4205(a), Table 1 for a 66 hp engine.

57-0392-05: 51 hp Generac SD020

	Pounds/Hour			Tons/Year				Date of Data	*	Applicable Standard
	Actual	Potential	Allowable	Actual	Potential	Allowable	Net Change			
PM**			0.03			0.01		8/29/14	1	40 CFR §60.4205(b)
SO_2			neg			neg		8/29/14	2	1200-03-14-.03(5)
CO**			0.42			0.10		8/29/14	1	40 CFR §60.4205(b)
VOC**			--			--		8/29/14	1	40 CFR §60.4205(b)
NO_x**			0.63			0.16		8/29/14	1	40 CFR §60.4205(b)
HAPs					neg	na		8/29/14	3	
CO_2e					14.6	na		8/29/14	5	

The above emission data are from standards found in 40 CFR 60.4025. The SO_2 emissions were calculated using 15 ppm sulfur content of the fuel (NSPS requirement), assuming all available sulfur is converted to SO_2. The ton per year allowables are calculated at 500 hr/yr per guidance found in the Seitz memo regarding PTE calculations for emergency engines.

* Source of data codes are found on the back of form APC-20.

** The allowable emission limits are subject to 40 CFR part 60 Subpart IIII. This emergency engine must meet the emission requirements in §60.4205(b) & §89.112, Table 1, Tier 2. The applicable standard for NO_x is in terms of NO_x + NMHC. Therefore, the allowable VOC emissions are accounted for in NO_x.

PERMITTING PROGRAM: JEF DATE: 11/26/2014

TDOT - Jackson District Facility

57-0392-01/969250P

300 horsepower diesel-fired, emergency generator engine.

Model	Model yr	br-hp	*KW	^MMBtu/hr	NSPS regulation (40 CFR X)	MACT?
John Deere 6081AF001	2006	300	223.674	2.1	60.4205(a)	YES

* 0.74558 kW / horsepower

^ an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr

Allowable emissions per engine, 40 CFR 60.4205(a), Table 1

Pollutant	Standard (gm/kW-hr)	Emissions (gm/hr)	Emissions (lb/hr)	Emissions (tpy)
PM	0.54	120.78396	**0.27**	**0.07**
NOx	9.2	2057.8008	**4.54**	**1.13**
HC	1.3	290.7762	**0.64**	**0.16**
CO	11.4	2549.8836	**5.62**	**1.41**

1 lb = 453.592 gm

HAPs totals from diesel combusion	lb/MMBtu	tpy
Benzene	9.33E-04	0.0005
Toluene	4.09E-04	0.0002
Xylenes	2.85E-04	0.0001
Propylene	2.58E-03	0.0014
1,3 Butadiene	3.91E-05	0.0000
Formaldehyde	1.18E-03	0.0006
Acetaldehyde	7.67E-04	0.0004
Acrolein	9.25E-05	0.0000
PAHs	1.68E-04	0.0001
		0.0034

For SO_2, 15 ppm maximum sulfur content of fuel. Assume all sulfur converted to SO_2

Every mole of sulfur will create one mole of sulfur dioxide

$$S + O_2 \text{ ---> } SO_2$$

13.7 gal fuel / hr (from application)	15 lb S / 10^6 gal fuel (from NSPS)	mol S / 32.065 lb S	mol SO_2 / mol S	64.066 lb SO_2 / mol SO_2	0.00041059	lb/hr SO2

Assume all sulfur converted to SO_2

GHGs from diesel combustion	**CO_2 EF (kg/MMBtu)**	**CH_4 EF (kg/MMBtu)**	**N_2O EF (kg/MMBtu)**	**CO_2e (tpy)**
	73.96	0.003	0.0001	85.7

CO_2e (tpy) = {[(heat input MmBtu/hr)*(500 hr/yr)*(2.205 lb/kg)]/(2000 lb/ton)}*[(CO_2 EF kg/MmBtu)+(25*CH_4 EF kg/MmBtu)+(298*N_2O EF kg/MmBtu)]

CO_2e calculation has the global warming potentials (GWP) for CH_4 and N_2O incorporated. CH_4 = 25 and N_2O = 298

Emission factors are the default emission factors found in 40 CFR 98 (Greenhouse gas reporting rule), Tables C-1 and C-2.

TDOT - Jackson District Facility

57-0392-02/969250P

36.3 horsepower diesel-fired, emergency generator engine.

Model	Model yr	br-hp	*KW	^MMBtu/hr	NSPS regulation (40 CFR X)	MACT?
Yanmar 4TNV84T	2006	36.3	27.064554	0.2541	60.4205(a)	YES

* 0.74558 kW / horsepower

^ an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr

Allowable emissions per engine, 40 CFR 60.4205(a), Table 1

Pollutant	Standard (gm/kW-hr)	Emissions (gm/hr)	Emissions (lb/hr)	Emissions (tpy)
PM	0.80	21.6516432	**0.05**	**0.01**
NMHC+NOx	9.5	257.113263	**0.57**	**0.14**
CO	5.5	148.855047	**0.33**	**0.08**

1 lb = 453.592 gm

HAPs totals from diesel combusion	lb/MMBtu	tpy
Benzene	9.33E-04	0.0001
Toluene	4.09E-04	0.0000
Xylenes	2.85E-04	0.0000
Propylene	2.58E-03	0.0002
1,3 Butadiene	3.91E-05	0.0000
Formaldehyde	1.18E-03	0.0001
Acetaldehyde	7.67E-04	0.0000
Acrolein	9.25E-05	0.0000
PAHs	1.68E-04	0.0000
		0.0004

For SO_2, 15 ppm maximum sulfur content of fuel. Assume all sulfur converted to SO_2

Every mole of sulfur will create one mole of sulfur dioxide

$$S + O_2 \text{ ---> } SO_2$$

1.9 gal fuel / hr (from application)	15 lb S / 10^6 gal fuel (from NSPS)	mol S / 32.065 lb S	mol SO_2 / mol S	64.066 lb SO_2 / mol SO_2	5.69431E-05	lb/hr SO2

Assume all sulfur converted to SO_2

	CO_2 EF (kg/MMBtu)	**CH_4 EF (kg/MMBtu)**	**N_2O EF (kg/MMBtu)**	**CO_2e (tpy)**
GHGs from diesel combustion	73.96	0.003	0.0001	10.4

CO_2e (tpy) = {[(heat input MmBtu/hr)*(500 hr/yr)*(2.205 lb/kg)]/(2000 lb/ton)}*[(CO_2 EF kg/MmBtu)+(25*CH_4 EF kg/MmBtu)+(298*N_2O EF kg/MmBtu)]

CO_2e calculation has the global warming potentials (GWP) for CH_4 and N_2O incorporated. CH_4 = 25 and N_2O = 298

Emission factors are the default emission factors found in 40 CFR 98 (Greenhouse gas reporting rule), Tables C-1 and C-2.

TDOT - Jackson District Facility

57-0392-04/969250P

66 horsepower diesel-fired, emergency generator engine.

Model	Model yr	br-hp	*KW	^MMBtu/hr	NSPS regulation (40 CFR X)	MACT?
John Deere 4039D	2006	66	49.20828	0.462	60.4205(a)	YES

* 0.74558 kW / horsepower

^ an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr

Allowable emissions per engine, 40 CFR 60.4205(a), Table 1

Pollutant	Standard (gm/kW-hr)	Emissions (gm/hr)	Emissions (lb/hr)	Emissions (tpy)
NOx	9.2	452.716176	**1.00**	**0.25**

1 lb = 453.592 gm

PM allowable TAPCR 1200-03-06-.02(2)(b).

0.6 lb/MMBtu

0.2772 lb/hr 0.0693 tpy

Potential	lb/hp-hr	lb/hr	tpy
PM	0.0022	0.15	0.0363
VOC	0.0025141	0.17	0.041483
CO	0.00668	0.44	0.11022

Emission factors from AP42, Table 3.3-1

HAPs totals from diesel combusion	lb/MMBtu	tpy
Benzene	9.33E-04	0.0001
Toluene	4.09E-04	0.0000
Xylenes	2.85E-04	0.0000
Propylene	2.58E-03	0.0003
1,3 Butadiene	3.91E-05	0.0000
Formaldehyde	1.18E-03	0.0001
Acetaldehyde	7.67E-04	0.0001
Acrolein	9.25E-05	0.0000
PAHs	1.68E-04	0.0000
		0.0007

For SO_2, 15 ppm maximum sulfur content of fuel. Assume all sulfur converted to SO_2

Every mole of sulfur will create one mole of sulfur dioxide

$$S + O_2 \text{ ---> } SO_2$$

2.8 gal fuel	15 lb S	mol S	mol SO_2	64.066 lb SO_2	8.39162E-05	lb/hr SO2
hr	10^6 gal fuel	32.065 lb S	mol S	mol SO_2		

from application from NSPS Assume all sulfur converted to SO_2

	CO_2 EF (kg/MMBtu)	**CH_4 EF (kg/MMBtu)**	**N_2O EF (kg/MMBtu)**	**CO_2e (tpy)**
GHGs from diesel combustion	73.96	0.003	0.0001	18.9

CO_2e (tpy) = {[(heat input MmBtu/hr)*(500 hr/yr)*(2.205 lb/kg)]/(2000 lb/ton)}*[(CO_2 EF kg/MmBtu)+(25*CH_4 EF kg/MmBtu)+(298*N_2O EF kg/MmBtu)]

CO_2e calculation has the global warming potentials (GWP) for CH_4 and N_2O incorporated. CH_4 = 25 and N_2O = 298

Emission factors are the default emission factors found in 40 CFR 98 (Greenhouse gas reporting rule), Tables C-1 and C-2.

TDOT - Jackson District Facility

57-0392-05/969250P

51 horsepower diesel-fired, emergency generator engine.

Model	Model yr	br-hp	*KW	^MMBtu/hr	NSPS regulation (40 CFR X)	MACT?
Generac SD020	2007	51	38.02458	0.357	89	YES

* 0.74558 kW / horsepower

^ an average brake-specific fuel consumption (BSFC) of 7,000 Btu/hp-hr

Allowable emissions per engine, 40 CFR 89.112, Tier 2

Pollutant	Standard (gm/kW-hr)	Emissions (gm/hr)	Emissions (lb/hr)	Emissions (tpy)
PM	0.4	15.209832	**0.03**	**0.01**
NMHC + NOx	7.5	285.18435	**0.63**	**0.16**
CO	5.0	190.1229	**0.42**	**0.10**

1 lb = 453.592 gm

HAPs totals from diesel combusion	lb/MMBtu	tpy
Benzene	9.33E-04	0.0001
Toluene	4.09E-04	0.0000
Xylenes	2.85E-04	0.0000
Propylene	2.58E-03	0.0002
1,3 Butadiene	3.91E-05	0.0000
Formaldehyde	1.18E-03	0.0001
Acetaldehyde	7.67E-04	0.0001
Acrolein	9.25E-05	0.0000
PAHs	1.68E-04	0.0000
		0.0006

For SO_2, 15 ppm maximum sulfur content of fuel. Assume all sulfur converted to SO_2

Every mole of sulfur will create one mole of sulfur dioxide

$$S + O_2 \text{ ---> } SO_2$$

1.76 gal fuel / hr (from application)	15 lb S / 10^6 gal fuel (from NSPS)	mol S / 32.065 lb S	mol SO_2 / mol S	64.066 lb SO_2 / mol SO_2	5.27473E-05	lb/hr SO2

Assume all sulfur converted to SO_2

	CO_2 EF (kg/MMBtu)	**CH_4 EF (kg/MMBtu)**	**N_2O EF (kg/MMBtu)**	**CO_2e (tpy)**
GHGs from diesel combustion	73.96	0.003	0.0001	14.6

CO_2e (tpy) = {[(heat input MmBtu/hr)*(500 hr/yr)*(2.205 lb/kg)]/(2000 lb/ton)}*[(CO_2 EF kg/MmBtu)+(25*CH_4 EF kg/MmBtu)+(298*N_2O EF kg/MmBtu)]

CO_2e calculation has the global warming potentials (GWP) for CH_4 and N_2O incorporated. CH_4 = 25 and N_2O = 298

Emission factors are the default emission factors found in 40 CFR 98 (Greenhouse gas reporting rule), Tables C-1 and C-2.

CONSTRUCTION PERMIT SUMMARY REPORT

Company Name: TDOT-Jackson District Facility | File Number: 57-0392 | EPS Initials: JEF

Permit Number(s): 969250P | Source Point Number(s): 01, 02, 04, 05

Application Received (date): September 3, 2014 | Application Complete (date): September 3, 2014

Air Quality Analysis Performed? Yes☐ No☒

Briefly describe the project: (new source, modifications) (what the process is) (type controls proposed) (emissions expected, qualitative) (replacing what sources) (background information)

This permit covers four (4) new internal combustion diesel-fired engines, each used for an emergency generator. The emergency engines are subject to NSPS, **Subpart IIII,** Standards of Performance for Stationary Compression Ignition Internal Combustion Engines. Additionally, the engines will meet the engine MACT (40 CFR 63 Subpart ZZZZ) by meeting the NSPS requirements in subpart IIII. This facility is an area source of hazardous air pollutants, and a minor source for PSD. An NOV was issued for constructing/operating without a permit.

The expected emissions from these sources are PM, SO_2, CO, VOC, NO_x. Pollution control equipment is not proposed for these sources.

Rules Analysis

Title V☐ Cond. Major☐ Minor☒ Source category listed in 1200-03-09-.01(4)(b)1.(i)? Yes☐ No☒

Reason for PSD:	New source above ____ TPY	☐	Sig. increase in ____ emissions	☐	N/A	☒
Applicable NSPS:	40 CFR Part 60, Subpart 4I	☒	State Rule 1200-03-16-.	☐	N/A	☒
Applicable NESHAP:	40 CFR Part 61, Subpart	☐	State Rule 1200-03-11-.	☐	N/A	☒
Applicable NESHAP:	40 CFR Part 63, Subpart 4Z	☒	State Rule 1200-03-31-.	☐	N/A	☒

Other Applicable State Rules

TSP Emissions:	1200-03-	06	-. 02(2)	☒	N/A ☐	NO_x Emissions:	1200-03-	07	-. 07(2)	☒	N/A ☐
SO_2 Emissions:	1200-03-	14	-. 03(5)	☒	N/A ☐	____ Emissions:	1200-03-	____	-. ____	☐	N/A ☐
CO Emissions:	1200-03-	07	-. 07(2)	☒	N/A ☐	____ Emissions:	1200-03-	____	-. ____	☐	N/A ☐
VOC Emissions:	1200-03-	07	-. 07(2)	☒	N/A ☐	____ Emissions:	1200-03-	____	-. ____	☐	N/A ☐

Visible Emissions from	Source	not to exceed	20	% opacity per Method	9	(Rule 1200-03- 05 -. 03(6))
Visible Emissions from		not to exceed		% opacity per Method		(Rule 1200-03- -.)
Visible Emissions from		not to exceed		% opacity per Method		(Rule 1200-03- -.)

Comments: _____